

I claim:

1. A process for manufacturing a titanium centrifugal compressor wheel (1), said wheel including a hub with a hub axis and a plurality of backswept aerodynamic blades carried on the surface of the hub and defining air passages between adjacent blades, said process comprising:

- (a) forging a titanium near net shape compressor wheel from forging stock; and
- (b) machining the product of step (a) to the desired net shape including machining undercut areas and optionally blade leading edges.

2. A process as in claim 1, wherein said forging is with a die having a main body structure which contains a die cavity and a second die structure which is movable relative to the body structure to perform a forging operation.

3. A process as in claim 2, wherein said second die structure is extractable along the hub axis.

4. A process as in claim 3, wherein said second die structure is extractable with helical twisting about the hub axis while extracting along the hub axis.

5. A process as in claim 2, wherein said die main body structure is segmented into two or more parts separable from one another generally radially of the hub axis of the compressor wheel and transversely of the axis of the die assembly.

6. A process as in claim 1, wherein said forging die is heated to a forging temperature prior to said step of forging.

7. A process as in claim 1, wherein said machining is by numerically-controlled cutting equipment.

8. A process as in claim 7, wherein said machining is selected from the group consisting of three axis milling to five axis milling, turning, abrasion, and electrical discharge machining.

9. A process as in claim 1, wherein said titanium compressor wheel is comprised of a 6Al 4V titanium.

10. A process as in claim 1, further comprising chemical milling.

11. A process for manufacturing a titanium centrifugal compressor wheel (1), said wheel including a hub with a hub axis and a plurality of backswept aerodynamic blades carried on the surface of the hub and defining air passages between adjacent blades, said process comprising:

preparing a quantity of titanium or titanium alloy stock shaped to fit within a cavity in a segmented zero draft die and having a volume approximately equal to that of a forged part to be manufactured in the die;

applying a protective coating to said stock;

heating said coated stock and said segmented zero draft die while separated to approximately a predetermined optimum forging temperature for said stock at least as high as about 1200°F;

coating all segments of said die with a lubricant before positioning the stock therein;

positioning the heated stock in the heated die;

heating the die and contained stock further after assembly together and as necessary to give the combination said forging temperature;

applying forging force to said heated segmented die to deform the heated stock toward the shape of said cavity to form a near net shape forged compressor wheel stock;

separating the sections of said segmented die and removing the near net shape forged stock therefrom;

finish machining the near net shape forged stock to the desired net shape including machining undercut areas and optionally blade leading edges.

12. A process as in claim 11, wherein said lubricant with which the die is coated before placement of the stock therein is a graphite suspension.